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Corn and Soybean Response to Sulfur Application Rate

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Abstract
Historically, sulfur (S) application has not been recommended on Iowa soils for corn and soybean production. Soil supply, or a combination from sources such as soil organic matter, profile sulfate, manure, and precipitation have met crop S needs. However, over the past several years, S deficiencies in alfalfa and corn have been documented. Large crop yield responses have been measured in some fields containing soils with low organic matter, side-slope landscape position, or coarse soil texture, especially in northeastern Iowa. The objective of this study was to determine S response of corn and soybean in north-central Iowa.

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Introduction

Historically, sulfur (S) application has not been recommended on Iowa soils for corn and soybean production. Soil supply, or a combination from sources such as soil organic matter, profile sulfate, manure, and precipitation have met crop S needs. However, over the past several years, S deficiencies in alfalfa and corn have been documented. Large crop yield responses have been measured in some fields containing soils with low organic matter, side-slope landscape position, or coarse soil texture, especially in northeastern Iowa. The objective of this study was to determine S response of corn and soybean in north-central Iowa.

Materials and Methods

Plots were established in 2011 on two sites, one with lower soil organic matter (3.8 to 4.7%) on a Clarion loam with 2 to 5 percent slope (lower organic matter site), and on another with a higher soil organic matter (5.4 to 6.1%) on a Webster clay loam with 0 to 2 percent slope (higher organic matter site). The previous 2010 crop was soybean. These plots were planted to corn in 2011 and 2012. Additional plots were established in 2012 near the lower organic site. The previous 2011 crop was corn. The additional plots were planted to soybean in 2012.

Calcium sulfate gypsum was broadcast applied at rates of 0, 5, 10, 20 and 40 lb S/acre and incorporated before planting in the spring of 2011 on the corn plots and spring of 2012 on the soybean plots. Plots were 20 × 50 ft. Treatments were replicated four times. The plots were machine harvested the length of the plots with a plot combine and grain yields were corrected to standard moisture.

Results and Discussion

On June 10, 2011 corn leaf greenness was visibly increased in plots receiving sulfur compared with the checks and surrounding bulk areas at both sites. By June 24, there was still a plant height increase due to S application, but the color differences were less. Despite the visual plant response, S fertilizer application at any rate had no statistically significant effect on corn grain yield at either site in 2011 (Table 1.). Conversely, in 2012 the residual-year corn plots showed no visible differences between plots receiving S and plots not receiving S, but there was a statistically significant yield response to the residual-year S.

In the soybean plots there was no statistically significant response to S application in 2012. This study will be continued in 2013.

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Table 1. Effect of sulfur fertilizer application on corn and soybean yield.

	Corn 2011		Corn 2012[a]		Soybean 2012
Sulfur rate	**Higher o. m.[b]**	**Lower o. m.**	**Higher o. m.**	**Lower o. m.**	**Lower o. m.**
lb S/acre	----------Yield, bu/acre----------				
0	192	187	82	80	35
5	184	188	100	99	35
10	190	187	105	109	34
20	191	191	105	113	34
40	187	183	111	104	36
Statistics	NS	NS	Sig.*	Sig.*	NS

[a]Corn sites in 2012 had S rates applied before 2011 corn.
[b]Higher or lower organic matter sites.
*Sig., Significant contrast between no S applied and mean of all S rates, $P \leq 0.10$.
NS, no significant differences.